
CHAPTER 1

Welcome and Executive Summary

INDUSTRY EARLY REVIEW DRAFT V.0.3 — 07/21/1999 9:03 AM—

NOTE to REVIEWERS: This is a very early draft version, and no effort has been made to reconcile changes in cross references to other chapters in the guide. Please look for comments such as this in the draft, which encourage your feedback on specific issues.

Please submit comments using the form on <http://www.pcdesguide.org> or by sending e-mail to comments@pcdesguide.org.

IMPORTANT: The requirements defined in this guide provide guidelines for designing PC systems that will result in an optimal user experience with typical Windows-based applications running under either the Microsoft Windows98 "Millennium" or later or Windows2000 Professional or later operating systems. These design guidelines are not the basic system requirements for running any version of Windows operating systems.

Contents

Executive Summary	2
How to Use This Guide	6
Required PC 2001 Features	7
Conventions Used in This Guide	7
References	8

Note to Reviewers: Executive overview information on networking and communications will be in the 0.5 draft

This guide is for engineers who build personal computers, expansion cards, and peripheral devices that will be used with the Microsoft® Windows® 2000 and Windows® 98 operating systems. The goal of this document is to provide guidelines for hardware design that will result in the optimal user experience, particularly when the hardware is used with the Windows family of operating systems.

This guide is co-authored by Intel Corporation and Microsoft Corporation. The requirements in this guide indicate features that the hardware industry

REVIEW DRAFT: FOR DISCUSSION AND REVIEW ONLY. The information contained in this document represents the current view of Intel Corporation and Microsoft Corporation on the issues discussed as of the date of publication. Because Intel and Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Intel and Microsoft, and Intel and Microsoft cannot guarantee the accuracy of any information presented. This document is for informational purposes only. INTEL AND MICROSOFT MAKE NO WARRANTIES, EXPRESS OR IMPLIED, IN THIS DOCUMENT. Please see the disclaimer for PC 2001 System Design Guide, which is included in this review package.

should consider in designing PCs and peripherals for various price levels and performance levels.

The clarifications, changes, and additional requirements in this guide include extensions and modifications to the requirements defined in *PC 99 System Design Guide* (Microsoft Press, 1998; ISBN 0-7356-0518-1).

This guide includes PC 2001 requirements for basic consumer and office implementations, such as desktop, mobile, and workstation systems, and for Easy PC systems. In this guide, the following requirements are defined:

- ?? Design requirements for specific types of systems that will run either Windows 98 or Windows 2000 operating systems
- ?? Design requirements related to the Easy PC Initiative, including requirements for legacy-free PC systems
- ?? Design requirements for devices supported under Windows 98 and Windows 2000, including graphics and video device capabilities, digital media, storage, networking and communications, and other devices

This guide does not address PC systems designed to act as servers in networked environments. It also does not address non-PC handheld computers running the Microsoft Windows CE operating system.

Executive Summary

Note to Reviewers: Intel and Microsoft are publishing this Version 0.3 EARLY REVIEW DRAFT for industry comment at a much earlier stage in the draft process than has occurred with previous editions of the PC System Design Guide projects.

This very early draft is offered to the industry to solicit comments about the topics that we intend to address, and also to ensure that system and peripheral vendors have early opportunities for input about how intended requirements will impact their business and technology plans for mid-2001 and later. Please see the instructions for submitting comments that you received with your review package, or see the web site at <http://www.pcdesguide.org>.

Overall Changes in Presentation

- ?? PC 2001 contains only requirements, with no recommended or optional items. Items formerly presented as recommendations or options are either restated for the conditions under which they are required or they have been eliminated.
- ?? Removal of redundant requirements. Items such as Plug and Play and driver installation requirements, boot BIOS requirements, media status notification, and so on are stated once, rather than being repeated in each chapter.

- ?? Bus requirements have been collected into one chapter.
- ?? Graphics and Video/broadcast requirements have been collected in a single chapter.
- ?? Network adapter and modem requirements have been collected in a single chapter.
- ?? The following topics—most of which have been repeated throughout the history of PC Design Guides and have no new changes for this draft—have been removed and collected in a reference library on the web at <http://www.pcdesguide.org>:
 - ?? *Legacy Plug and Play Guidelines*
 - ?? *PC Card Guidelines for Windows*
 - ?? *Performance Guidelines for Software-based Modems* [TBD]
- ?? Many PC 99 guidelines have been carried over to this new draft; others have been dropped, and some are new to this draft.
 - ?? PC 99 carryovers are marked with their old number enclosed in brackets.
 - ?? New guidelines are marked with [NEW].
 - ?? Many deleted items have been removed from the place they appeared in PC99 because:
 - 1) We are attempting to eliminate redundancy but the item is still required.
 - 2) PC 2001 emphasizes legacy-free and drastic legacy-reduced designs—so the legacy-related design guidelines have been removed as described above, but remain requirements.
 - ?? Some requirements have been removed because those features are no longer important to the industry, or they are no longer relevant in defining the optimal user experience with the Windows operating system.

Note to Reviewers: Please comment on the utility of this organization in relation to how you use this guide. Also, please comment on your preference for [1] retaining PC99 numbering vs [2] implementing a new numbering system.

Easy PC Initiative and Other Initiatives

The Easy PC Initiative describes a technology vision for making the Windows platform easy to use. The key goal is to produce new PC products that are easy to set up, easy to use, and easy to expand, and that allow system designs to create new form factors.

In PC 2001, the Easy PC Initiative presents the most ambitious challenge for the industry: to remove the legacy hardware, firmware, and ergonomic barriers to PC use, and to create exciting new PC designs that will both advance the platform and attract new classes of PC users.

An Easy PC system (or any other legacy-free system) must meet the following new guidelines:

- ?? No BIOS boot dependencies on ISA or other legacy devices, and no ISA-related components appear on BIOS setup screen, plus new legacy-free BIOS requirements and new ACPI mechanisms to support legacy-free systems.
- ?? No Super I/O (that is, no 8042 controller, serial, parallel, or legacy IR ports) or related devices, and no floppy disk controller (FDC).
- ?? ACPI-compliant wired APIC.
- ?? A debug port compliant with *Microsoft Debug Port Specification*.

Core Architecture

Under the PC 2001 guidelines, every desktop PC system must meet new goals for migration away legacy components:

- ?? Only non-legacy peripherals are bundled with the system.
- ?? No FDC-based floppy drive is provided with the system, and the related FDC hardware and BIOS support are removed from the system.
- ?? System ships with two of a total four USB ports free for the end user's use.
- ?? TBD: Minimum performance, manageability additions, new power interface, ergonomic and accessibility additions.

Workstation PCs

- ?? New requirements related to 64-bit architecture and related PCI bus issues.

Mobile PCs

- ?? New performance requirements, and clarifications for docking under Windows 2000.

Easy PC

- ?? New performance requirements for a PC with removal of legacy hardware.

Buses

- ?? IEEE 1394b-2000 is introduced as the standard for controllers and devices.
- ?? PCI Revision 2.2 is defined as the standard for the bus and devices.

Graphics, Video, and Monitors

- ?? New Digital Visual Interface (DVI) standards and requirements are introduced, for both graphics adapters and monitors. Graphics adapters and

monitors that include digital monitor connectors must comply with the DVI standard. Monitor requirements are defined for *all* monitors, digital, and analog requirements.

- ?? Simplify/clarify/consolidate/condense current requirements, and update reference documentation
- ?? Update 3D features to reflect Microsoft DirectX implementation
- ?? Shared Memory Architecture (integrated graphics in North Bridge)
- ?? Hardware feature recommendation and constraints for GDI+
- ?? Requirement for 8-bit alpha blending of video when in 32-bit color mode
- ?? Requirement for systems claiming Digital TV support to have All Format MPEG decode support (for example, decode support for up to six times standard definition rates)
- ?? A simplification of the language used to describe the ever increasing need for improved video quality on the PC platform

Audio

- ?? The legacy free requirements for audio hardware are now stronger. Specifically, PC 2001 requires that audio hardware does not utilize legacy interfaces in both Windows and MS-DOS.
- ?? The next version of the PC 2001 specification will contain implementation requirements for certain optional capabilities. Examples include DirectSound and DirectMusic acceleration. Audio hardware with these features must enumerate and implement them in a standardized way.

Networking and Communications

Note to Reviewers: Executive overview information on networking and communications will be in the 0.5 draft.

Storage

- ?? All common option ROM and connector requirements are consolidated for easy reference. Similar consolidation for common bus and storage items.
- ?? Legacy floppy drive elimination; new information on rewritable drives and types.
- ?? DVD coverage expanded to include DVD-RAM, +RW, and others.
- ?? Requirements for CD and DVD read rates are altered to allow faster, broader acceptance of CDR/RW, and DVD rewritable formats where error correction and defect management are imperative.

Imaging and Printers

- ?? USB is the required connector for digital cameras that generate uncompressed images of more than 800K pixels.
- ?? Color matching requirements for digital imaging devices and printers include sRGB output and new Delta E tolerance requirements.
- ?? Printers must have a USB or IEEE 1394 interface, which can be provided in addition to any legacy connection such as serial or IEEE 1284.

How to Use This Guide

The PC 2001 requirements are defined by system architecture and for individual bus classes and device classes.

PC 2001 V.0.3 Draft Organization

This design guide is divided into three parts.

- ?? **Part 1: System Design Issues and Initiatives.** Introduces important design issues and the latest initiatives for PC 2001. Study this part first to understand the key design issues and initiatives addressed in the PC 2001 requirements.

Note to Reviewers: In v.0.3, only the Easy PC Initiative is presented in detail.

- ?? **Part 2: System Design Guidelines.** Presents system-type definitions and PC 2001 requirements for each system type. Study this part for an understanding of the overall system requirements.

- ?? Core PC 2001 System Guidelines
- ?? Workstation 2001 Guidelines
- ?? Mobile PC Guidelines
- ?? Easy PC Guidelines

- ?? **Part 3: Device Class Subsystem Design Guidelines.** Presents requirements for each device class supported under Windows 2000. Study this part for a detailed understanding of how devices are implemented on PC 2001 systems.

- ?? Buses and Interfaces
- ?? Input Devices
- ?? Graphics and Video Subsystem and Device Guidelines
- ?? Monitors
- ?? Audio
- ?? Storage
- ?? Communications (network adapters and modems)

?? Printers

?? Still Image Peripheral Devices (cameras and scanners)

Appendixes. Includes the PC 2001 checklist, which summarizes all the requirements defined in this guide, plus other technical appendixes.

Note to Reviewers: Appendixes are not provided in the v0.3 draft.

Updates to this and related PC design guidelines, technical clarifications, and answers to frequently asked questions are available on the web site at <http://www.pcdesguide.org>.

Required PC 2001 Features

In this guide, hardware features are **all** described as *Required*. For PC 2001, these terms are used to mean the following:

?? **Required:** These basic features must be implemented in order for hardware to comply with PC 2001 requirements.

?? **If implemented...:** These features add capabilities that are supported by the Windows family of operating systems. These features take advantage of the native capabilities of the drivers included with the operating system, usually without imposing major cost increases. These features do not have to be implemented. The related item states what is required if the feature is implemented.

In this guide, these words can be understood as follows with regard to PC 2001 requirements:

?? **Must:** Required

?? **Should:** Encouraged for the OEM or desirable for the user

IMPORTANT: The requirements in this guide are often provided in the form of references to industry specifications. These specifications might contain intellectual property of Intel, Microsoft, or other third parties. Each of these industry specifications might have different intellectual property licensing arrangements. It is the responsibility of the original equipment manufacturer (OEM) to consult these industry specifications or their issuance bodies for licensing specifics or details.

Conventions Used in This Guide

The following conventional terms are used throughout this guide. In addition, see the Hardware Glossary in the References part of this guide.

Convention	Meaning
Add-on device	Refers to devices that are traditionally added to the basic PC system to increase functionality. Examples include audio, networking, graphics, small computer system interface (SCSI) controller, and so on. Add-on devices fall into two categories: devices built on to the system board and devices on expansion cards added to the system through a system-board connector, such as Peripheral Component Interconnect (PCI).
Intel Architecture	Refers to computers based on 32-bit or 64-bit microprocessors that use the Intel Architecture instruction set, such as Intel® 80486, Intel Pentium®, Pentium Pro, Pentium II, Pentium III or compatible processors.
PC 2001	Collection of the additional requirements and recommendations defined in this guide that make up the 2001–2003 requirements for PC system design.
Alpha architecture	Refers to Windows 2000-compatible computers based on reduced instruction set computing (RISC) architecture. Notice that all requirements for Alpha architecture are for the Windows 2000 operating system only.
System device	Also <i>on-board device</i> . Refers to devices on the system board such as interrupt controllers, keyboard controller, real-time clock, direct memory access (DMA) page registers, DMA controllers, memory controllers, floppy disk controller (FDC), hard disk controller (HDC), serial and parallel ports, PCI bridges, and so on. In today's PCs, these devices are typically integrated with the supporting chip set.
Windows	For PC 2001, refers to the Microsoft Windows 98 operating system, including any add-on capabilities and any later versions of the operating system.
Windows 2000	For PC 2001, refers to the Microsoft Windows 2000 Professional operating system, including any add-on capabilities and any later versions of the operating system.

References

The following table lists some of the information resources, services, and tools available from Intel and Microsoft to help build hardware that is compliant with the PC 2001 requirements. In addition, each chapter in this guide contains a reference section.

Resource	Address
Intel information for developers	http://developer.intel.com/
Microsoft information for hardware manufacturers	http://www.microsoft.com/hwdev/ E-mail: ihv@microsoft.com
Windows 98 and Windows 2000 Driver Development Kits (DDKs)	http://www.microsoft.com/ddk/ Also provided with Microsoft Developer Network (MSDN) Professional membership. To subscribe: Fax: (425) 936-7329, Attn: Developer Network E-mail: msdn@microsoft.com http://www.microsoft.com/msdn/subscribe/
System Test Implementers Forum	http://www.systemtest.org/
Microsoft Windows Hardware Quality Labs testing tools	http://www.microsoft.com/hwtest/